

Fishery Management Report No.15-37

Pasagshak River Weir Report, 2015

by

Mark J. Witteveen

September 2015

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)		General		Mathematics, statistics	
centimeter	cm	Alaska Administrative Code	AAC	<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	H _A
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	<i>e</i>
hectare	ha			catch per unit effort	CPUE
kilogram	kg	at	@	coefficient of variation	CV
kilometer	km			common test statistics	(F, t, χ^2 , etc.)
liter	L	compass directions:		confidence interval	CI
meter	m	east	E	correlation coefficient (multiple)	R
milliliter	mL	north	N	correlation coefficient (simple)	r
millimeter	mm	south	S	covariance	cov
Weights and measures (English)		west	W	degree (angular)	°
	cubic feet per second	ft³/s	copyright	degrees of freedom	df
	foot	ft	corporate suffixes:	expected value	<i>E</i>
	gallon	gal	Company	greater than	>
	inch	in	Corporation	greater than or equal to	≥
	mile	mi	Incorporated	harvest per unit effort	HPUE
	nautical mile	nmi	Limited	less than	<
	ounce	oz	District of Columbia	D.C.	less than or equal to
pound	lb	et alii (and others)	et al.	logarithm (natural)	ln
quart	qt	et cetera (and so forth)	etc.	logarithm (base 10)	log
yard	yd	exempli gratia		logarithm (specify base)	log ₂ , etc.
Time and temperature		(for example)	e.g.	minute (angular)	'
	day	d	Federal Information Code	not significant	NS
	degrees Celsius	°C	id est (that is)	null hypothesis	H ₀
	degrees Fahrenheit	°F	latitude or longitude	percent	%
	degrees kelvin	K	monetary symbols (U.S.)	probability	P
	hour	h	months (tables and figures): first three letters	probability of a type I error (rejection of the null hypothesis when true)	α
minute	min	registered trademark	Jan,...,Dec	probability of a type II error (acceptance of the null hypothesis when false)	β
second	s	trademark	® ™	second (angular)	"
Physics and chemistry		United States (adjective)	U.S.	standard deviation	SD
	all atomic symbols		United States of America (noun)	standard error	SE
	alternating current	AC	U.S.C.	variance	
	ampere	A	U.S. state	population sample	Var var
	calorie	cal			
	direct current	DC			
	hertz	Hz			
	horsepower	hp			
	hydrogen ion activity (negative log of)	pH			
	parts per million	ppm			
parts per thousand	ppt, ‰				
vols	V				
watts	W				

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ABSTRACT

A fish-counting weir was installed in the Pasagshak River during 2015 by the Alaska Department of Fish and Game to enumerate sockeye salmon *Oncorhynchus nerka* escapement into Lake Rose Teed. Escapement was enumerated through the weir daily from June 18 through August 15. The conventional wood tripod and aluminum panel weir was replaced with a plastic floating weir on July 14 in response to a particularly heavy debris load and high water levels. The total number of sockeye salmon counted through the weir was 2,077 fish. Escapement was low for the second season in a row and the sport, commercial, and subsistence fisheries were closed on July 3. Additionally, 11 pink salmon *O. gorbuscha*, 3 chum salmon *O. keta*, and 1 coho salmon *O. kisutch* were counted through the weir. Sockeye salmon were sampled for age, sex, and length after being captured with a beach seine behind the weir. Due to low salmon abundance, no sockeye salmon were available to sample from the subsistence gillnet harvest in Pasagshak Bay. The average length (mid eye to tail fork) of Pasagshak River sockeye salmon escapement was 513 mm, and the dominant age class was age-1.2.

Key words: sockeye salmon, ASL, subsistence, Pasagshak River, Lake Rose Teed.

INTRODUCTION

Pasagshak River, located on the Kodiak road system (Figures 1 and 2), has recently supported one of the largest sockeye salmon *Oncorhynchus nerka* subsistence fisheries for Kodiak Island residents (Alaska Department of Fish and Game [ADF&G] subsistence database; Figures 3 and 4). During the past 2 decades, subsistence harvest of Pasagshak River sockeye salmon has increased disproportionately to escapement (Figure 3). During the past 2 seasons, sockeye salmon escapement at the Pasagshak River has been lower than recent years and has failed to meet the peak aerial survey based lower bound SEG of 3,000 fish (Figure 3).

Previous escapement enumeration methodology provided only postseason estimates via aerial and foot surveys of the spawning grounds, making inseason subsistence and sport fisheries management impossible and refinement of an escapement goal for this stock problematic. A conventional wood tripod and aluminum panel weir was constructed near the outlet of the lake by ADF&G during 2011 through 2015 to provide timely and accurate escapement information to help maintain the sustainability of this important subsistence and recreational use salmon run.

The Pasagshak River is located on the northeast side of Kodiak Island and is accessible by car from the city of Kodiak (Figure 1). Lake Rose Teed (formerly spelled Rose Tead), which drains into the Pasagshak River, is a small, shallow lake (0.94 km²; 2.1 m average depth). Prior to the 1964 earthquake and subsequent tsunami, Lake Rose Teed had little salmon rearing habitat; however, the earthquake lowered the elevation of the lake, allowing nutrient rich marine water to enter the lake during high tide cycles, dramatically increasing the salmon rearing potential (Murray 1986). Pasagshak River State Recreational Site is the only designated park land that is outside of the immediate city area but still within the road system (Figure 2). The mouth of the Pasagshak River is also a prehistoric native settlement site (P. Saltonstall, Curator, Alutiiq Museum, Kodiak, personal communication).

From 1968 to 2010, Pasagshak River salmon escapement had been estimated postseason using both aerial and foot surveys of the spawning grounds. Although annual survey estimates have been highly variable, sockeye salmon production has generally increased through that time period (Figure 3). Surveys took place on the spawning grounds and estimates of the escapement were not made until well after the fish escaped the subsistence, sport, and commercial fisheries. Because escapement was not estimated in season, no management action to regulate harvests was possible, and overharvest could have occurred without being detected at which point any action

would be too late. The current escapement goal for Pasagshak River sockeye salmon is a lower-bound sustainable escapement goal of 3,000 fish (Sagalkin et al. 2013) based on peak aerial surveys.

Subsistence harvest of this salmon stock increased from the time subsistence records were initiated in 1986 through 2004 and has remained fairly constant until the 2014 season. During 2008, 2009, and 2013, the Pasagshak River was the largest subsistence salmon fishery in the Kodiak Management Area (Figure 4; ADF&G Subsistence Database; KMA). During recent years prior to 2010, 2 other significant sockeye salmon runs near the City of Kodiak, Afognak and Buskin lakes, experienced significant reductions in run size, restricted fishing opportunities, and total subsistence fishing closures in some years (Baer et al. 2009; Dinnocenzo et al. 2009; Jackson et al. 2010). Such restrictions on stocks can displace users to other systems (Magdanz et al. 2003), leading to concern that without a weir in place, Pasagshak River sockeye salmon would incur increased harvest pressure while ADF&G was unable to monitor escapement in season.

Timely inseason estimates of Pasagshak River sockeye salmon escapement were made during 2011 through 2015 by operation of a weir near the outlet of Lake Rose Teed. Age, sex, and length (ASL) data were also collected with a trap attached to the upstream portion of the weir as well as a beach seine downstream of the weir.

In addition to the installation and annual operation of the escapement monitoring weir, important information on subsistence effort at the Pasagshak River was obtained through harvester interviews conducted by ADF&G technicians. Subsistence harvests ASL data augment ASL data obtained from the weir trap and beach seine and provide valuable information on the harvest composition, size selectivity, and magnitude relative to escapement.

METHODS

The Pasagshak River weir was installed and fish tight on June 18, 2015, approximately 300 m downstream of the outlet of Lake Rose Teed, and escapement was enumerated through August 15. Operation of the weir was conducted in accordance with the Pasagshak River salmon weir operational plan (Witteveen 2015). The gate to allow fish passage was opened daily, approximately every 2 to 3 hours between 7:00 AM and midnight. All species including sockeye, pink *O. gorbuscha*, coho *O. kisutch*, chum salmon *O. keta*, and Dolly Varden *Salvelinus malma*, were enumerated.

During the high tidal cycles (with high tides of 9.3 ft or greater), a strong upstream current occurs at the weir location. With the knowledge gained from the 2011 season that weir panels had to be secured to the tripods with Telespar®¹ and lagbolts, the weir was able to withstand those currents during 2012 through 2014. Increased algal debris encountered during 2015 resulted in scouring of the river bottom, and maintaining the weir was even more difficult than in past years. As a result, a PVC floating weir with a heavy chain anchoring system was acquired from the ADF&G office in Homer and installed on July 14. This weir allowed easier cleaning and the chain conformed to the river bottom so that substrate scouring did not occur, resulting in a hole through which fish could escape. This increased the efficacy of the weir remaining fish tight and significantly reduced the workload of keeping the weir free of debris. Since the floating

¹ Product names are included for completeness but do not constitute endorsement.

weir was not quite long enough to span the width of the river, a short section of conventional tripod and aluminum panel weir was installed on one side of the river (Figure 5).

ASL sampling from sockeye escapement was conducted with a season goal of 600 fish. The heavy debris load precluded successful installation of the sampling trap, so samples were acquired by capturing fish with a beach seine behind the weir. Adipose fins were clipped from fish as they were sampled so that if fish remained behind the weir, they were not sampled more than once. All scales, when possible, were collected from the preferred area of each fish following procedures outlined by the International North Pacific Fisheries Commission (INPFC 1963). The “preferred scale” (located on the left side of the fish, 2 rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin) was removed with forceps and mounted on a scale “gum” card. The sex and length of the fish (fish length in millimeters from mid eye to tail fork [METF]) were also recorded.

All scales collected were mounted on scale cards and impressions were made on cellulose diacetate (Clutter and Whitesel 1956). Fish ages were assigned by examining scale impressions for annual growth increments using a microfiche reader fitted with a 48× lens following designation criteria established by Mosher (1968). Ages were entered directly into the salmon database using European notation (Koo 1962), in which a decimal separates the number of winters spent in fresh water (after emergence) from the number of winters spent in salt water.

ADF&G technicians opportunistically contacted sockeye salmon subsistence fishermen on the fishing grounds in front of the Pasagshak River or at Pasagshak State Recreation Area boat landing; however, there was very limited opportunity due to low effort and a fishery closure.

RESULTS

The total sockeye salmon escapement through the Pasagshak River weir in 2015 was 2,077 fish (Table 1). In addition, 11 pink, 3 chum, and 1 coho salmon (Table 1) passed through the weir. Sockeye salmon escapement was well below the escapement goal of 3,000 fish. The daily sockeye salmon escapement lacked a defined peak and several fish remained behind the weir in a deep hole, even after the weir was removed (Figures 6 and 7). Larger pulses of daily passage did not correlate as well with increasing tidal cycles as observed in other years (Figure 6). Sockeye salmon were often observed holding in various portions of the river for several days before they approached and passed through the weir, so salmon entry in to the river may be related to tidal cycles but passage through the weir may be delayed, masking the relationship. During 2015 fish held in deeper water behind the weir for an extended period of time in late July and August. After the weir was removed, most of the fish remained in the deeper water. The number of fish holding in the hole was estimated when the weir was pulled for the season and added to the total escapement as a post weir estimate (Table 1).

Trapping fish at the weir for ASL samples continued to be difficult in 2015. Excessive biological debris caused weir panels to clog up, limiting water passage and creating a water current across the weir rather than through it. This caused scouring of the substrate below the weir as well as the trap. With the intense workload required to keep the weir fish tight and the high water conditions in June, a trap was only installed one time and was completely scoured the next day. Fish sampled for ASL were captured with a beach seine behind the weir on June 30, July 22, and August 13. A total of 305 samples were ageable. Due to low subsistence fishing effort and a fishery closure on July 3, no fish were sampled from the subsistence fishery.

The dominant age of Pasagshak River sockeye salmon escapement was age-1.2 fish, which composed about 34.4 percent of the escapement (Table 2). There were also large percentages of age-0.3 (28.7%) and -1.3 (25.3%) fish in the escapement. With such a small sample size, temporal trends in age compositions were not examined. The 2015 age composition structure was different than all other years of this project (Witteveen 2011, 2012, 2013, 2014), with age-1.2 comprising the largest percentage for the first time.

Pasagshak River sockeye salmon are typically large compared to other Kodiak Management Area sockeye salmon (ADF&G Age, sex, and length salmon database). During 2015, the average length of sockeye salmon was 513 mm from the escapement (Table 3), much smaller than the average of 546 mm from 2011 to 2014. There was a higher proportion of ocean-age-2 fish during 2015 which likely contributed to the smaller average size. While all of the data from other sockeye salmon systems in the Kodiak area have not been compiled yet, early reports are that most sockeye salmon observed during 2015 were smaller than average.

DISCUSSION

Passage of sockeye salmon through the Pasagshak River occurred primarily during July and early August, later than most Kodiak-area early sockeye salmon runs but earlier than most late sockeye salmon runs (Foster 2011). Daily escapement seemed to be less dependent on tidal cycle (Figure 6) than during other seasons. Fish tended to hold behind the weir more during 2015 season rather than migrating directly to the lake, perhaps due to the relatively warm water temperatures. Sockeye salmon escapement into Lake Rose Teed during 2015 was poor, with only about two-thirds of the escapement goal of 3,000 fish being achieved.

Age composition of Pasagshak River fish was primarily age-1.2 fish in 2015, but it also had high proportions of age-0.2, -0.3, and -1.3 fish. The high proportion of age-0.2 and -0.3 fish is less common in most Kodiak area sockeye salmon systems (Foster 2011). Age-0 fish are typically found in locations with characteristics similar to the Pasagshak system, such as Cinder and Ilnik rivers. These systems have a significant estuarine environment, areas with significant marine nutrient input, a lack of deepwater overwintering area, or protected marine rearing environments (Foster 2011; Moore 2011). Conversely, nearby stocks such as Saltery and Buskin lakes have deep lakes and lack estuarine habitat and typically do not have a substantial component of age-0 fish. The productive estuarine rearing area likely allows juvenile fish to grow rapidly enough to enter the salt water in their first year.

The parent year for age-1.2 and -0.3 fish was 2011. Escapement from 2011 was strong, with 13,402 sockeye salmon passing the weir; however, a record rainfall of 3.46" on September 12, 2011 could have scoured eggs from the gravel affecting survival. While age-1.2 were dominant this season for the time during this project, the actual number of age-1.2 fish (714) was within the range of observed numbers from other years (2011–2014 range: 144 to 4,294). Conversely, age-1.3 fish which have been the dominant age class in 3 of the 5 years of this project, had the lowest run numbers recorded (2011-2015; 525 fish). The parent year for age-1.3 fish was 2010, and while the weir was not in place so the aerial survey escapement estimates are not directly comparable to weir counts, the estimate of 5,000 sockeye salmon was below average. Aerial surveys performed during the years that the weir has been in place have varied in accuracy. This season, the tributaries above the lake were mostly dry due to low water, and while only 600 sockeye salmon were observed in the post-season aerial survey, 2,000 fish were observed in a post-season foot survey (Appendix A1).

The variable age composition and varying age trends inseason suggest a dynamic system in which fish exhibit different life histories depending on variable fresh water conditions (Figure 8). It is reasonable to conclude that run size in this system could be widely variable between years.

Subsistence harvest was too low to assess trends in effort, and Pasagshak Bay was closed to subsistence and commercial fishing on July 3. Subsistence harvest records are not available until later in the year.

The floating weir installed midseason was much more resilient to scouring and upstream flow during high tide cycles and was easier to clean than the tripod weir. The weir was installed very near a deepwater section in which fish tended to hold (Figure 9). Fish would probably tend to pass through the weir more readily if the weir was installed further upstream. During very large tides, the current was strong enough to flip the middle of the floating weir upstream; however, it still remained fish tight (Figure 10). If this project continues in future years, using the floating weir instead of the aluminum and tripod weir is recommended.

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TABLES AND FIGURES

Table 1.–Daily and cumulative counts of salmon passage through the Pasagshak River weir, 2015.

Date	Number of Salmon							
	Sockeye Daily	Sockeye Cumulative	Pink Daily	Pink Cumulative	Chum Daily	Chum Cumulative	Coho Daily	Coho Cumulative
18-Jun	35	35	0	0	0	0	0	0
19-Jun	2	37	0	0	0	0	0	0
20-Jun	17	54	0	0	0	0	0	0
21-Jun	9	63	0	0	0	0	0	0
22-Jun	8	71	3	3	0	0	0	0
23-Jun	1	72	0	3	0	0	0	0
24-Jun	2	74	0	3	0	0	0	0
25-Jun	0	74	0	3	0	0	0	0
26-Jun	1	75	0	3	0	0	0	0
27-Jun	0	75	1	4	0	0	0	0
28-Jun	0	75	0	4	0	0	0	0
29-Jun	266	341	0	4	0	0	0	0
30-Jun	95	436	0	4	0	0	0	0
1-Jul	144	580	1	5	0	0	0	0
2-Jul	30	610	0	5	0	0	0	0
3-Jul	0	610	0	5	0	0	0	0
4-Jul	8	618	0	5	0	0	0	0
5-Jul	1	619	0	5	0	0	0	0
6-Jul	0	619	0	5	0	0	0	0
7-Jul	0	619	0	5	0	0	0	0
8-Jul	0	619	0	5	0	0	0	0
9-Jul	0	619	0	5	0	0	0	0
10-Jul	10	629	0	5	0	0	0	0
11-Jul	0	629	0	5	0	0	0	0
12-Jul	50	679	0	5	0	0	0	0
13-Jul	1	680	0	5	0	0	0	0
14-Jul	0	680	0	5	0	0	0	0
15-Jul	2	682	0	5	0	0	0	0
16-Jul	0	682	0	5	0	0	0	0
17-Jul	0	682	0	5	0	0	0	0
18-Jul	48	730	0	5	0	0	0	0
19-Jul	1	731	0	5	0	0	0	0
20-Jul	0	731	0	5	0	0	0	0
21-Jul	0	731	0	5	0	0	0	0
22-Jul	0	731	0	5	0	0	0	0
23-Jul	0	731	0	5	0	0	0	0
24-Jul	109	840	0	5	0	0	0	0
25-Jul	0	840	0	5	0	0	0	0
26-Jul	0	840	0	5	0	0	0	0

-continued-

Table 1.–Page 2 of 2.

Date	Number of Salmon							
	Sockeye Daily	Sockeye Cumulative	Pink Daily	Pink Cumulative	Chum Daily	Chum Cumulative	Coho Daily	Coho Cumulative
27-Jul	0	840	0	5	0	0	0	0
28-Jul	169	1,009	0	5	0	0	0	0
29-Jul	4	1,013	0	5	0	0	0	0
30-Jul	0	1,013	0	5	0	0	0	0
31-Jul	90	1,103	0	5	0	0	0	0
1-Aug	31	1,134	0	5	0	0	0	0
2-Aug	81	1,215	0	5	0	0	0	0
3-Aug	6	1,221	0	5	0	0	0	0
4-Aug	96	1,317	0	5	0	0	0	0
5-Aug	0	1,317	0	5	0	0	0	0
6-Aug	10	1,327	0	5	0	0	0	0
7-Aug	6	1,333	2	7	0	0	0	0
8-Aug	6	1,339	0	7	1	1	0	0
9-Aug	72	1,411	1	8	0	1	0	0
10-Aug	70	1,481	0	8	0	1	0	0
11-Aug	15	1,496	2	10	0	1	0	0
12-Aug	9	1,505	0	10	0	1	0	0
13-Aug	95	1,600	0	10	1	2	1	1
14-Aug	26	1,626	1	11	1	3	0	1
15-Aug	1	1,627	0	11	0	3	0	1
Post Weir Estimate	450	2,077	0	11	0	3	0	1
Total		2,077		11		3		1

Table 2.—Estimated age composition of Pasagshak River sockeye salmon escapement, 2015 (interpolated between sampling events).

Stat Week	Sample Fish		Ages						Total Fish
			0.2	0.3	1.2	1.3	2.1	2.3	
25 (June 6 – 20)	0	Percent Numbers	5.9 3	35.3 19	23.5 13	35.3 19	0.0 0	0.0 0	100.0 54
26 (June 21 – 27)	0	Percent Numbers	5.9 1	35.3 7	23.5 5	35.3 7	0.0 0	0.0 0	100.0 21
27 (June 28 – July 4)	17	Percent Numbers	6.0 32	35.0 191	24.5 129	34.4 190	0.0 0	0.0 0	100.0 543
28 (July 5 – 11)	0	Percent Numbers	6.7 1	33.8 4	29.0 3	30.5 3	0.0 0	0.0 0	100.0 11
29 (July 12 – 18)	0	Percent Numbers	7.5 8	32.5 33	33.8 34	26.2 27	0.0 0	0.0 0	100.0 101
30 (July 19 – 25)	109	Percent Numbers	8.5 10	31.0 33	38.0 42	22.5 24	0.0 0	0.0 0	100.0 110
31 (July 26 – August 1)	0	Percent Numbers	10.8 32	28.6 84	38.9 114	21.4 63	0.2 1	0.2 1	100.0 294
32 (August 2 – 8)	0	Percent Numbers	13.3 26	25.9 54	39.3 80	20.8 43	0.4 1	0.4 1	100.0 205
33 (August 9 –15)	179	Percent Numbers	15.7 45	23.4 68	39.6 114	20.2 58	0.5 1	0.5 1	100.0 288
34 (August 16 – 22)	0	Percent Numbers	16.2 73	22.9 103	39.7 178	20.1 91	0.6 3	0.6 3	100.0 450
Totals	305	Percent Numbers	11.1 231	28.7 597	34.4 714	25.3 525	0.3 5	0.3 5	100.0 2,077

Table 3.—Length composition of Pasagshak River sockeye salmon escapement samples by age and sex, 2015.

	Ages						Total
	0.2	0.3	1.2	1.3	2.1	2.3	
Mean Length Females	469	520	485	521	0	545	501
Standard Error Females	9.4	3.6	3.01	3.9	0	0	3.25
Range Females	390–550	425–544	427–587	437–580		545–545	390–587
Sample Size Females	17	41	72	38	0	1	169
Mean Length Males	511	550	509	556	350	0	529
Standard Error Males	11.03	5.27	4.41	3.71	0	0	3.72
Range Males	385–594	427–604	418–587	509–590	350–350		350–604
Sample Size Males	22	38	43	25	1	0	129
Mean Length	493	534	494	535	350	545	513
Standard Error	8.1	3.54	2.72	3.49	0	0	2.3
Range	385–594	425–604	418–587	437–590	350–350	545–545	350–604
Sample Size	39	79	115	63	1	1	298

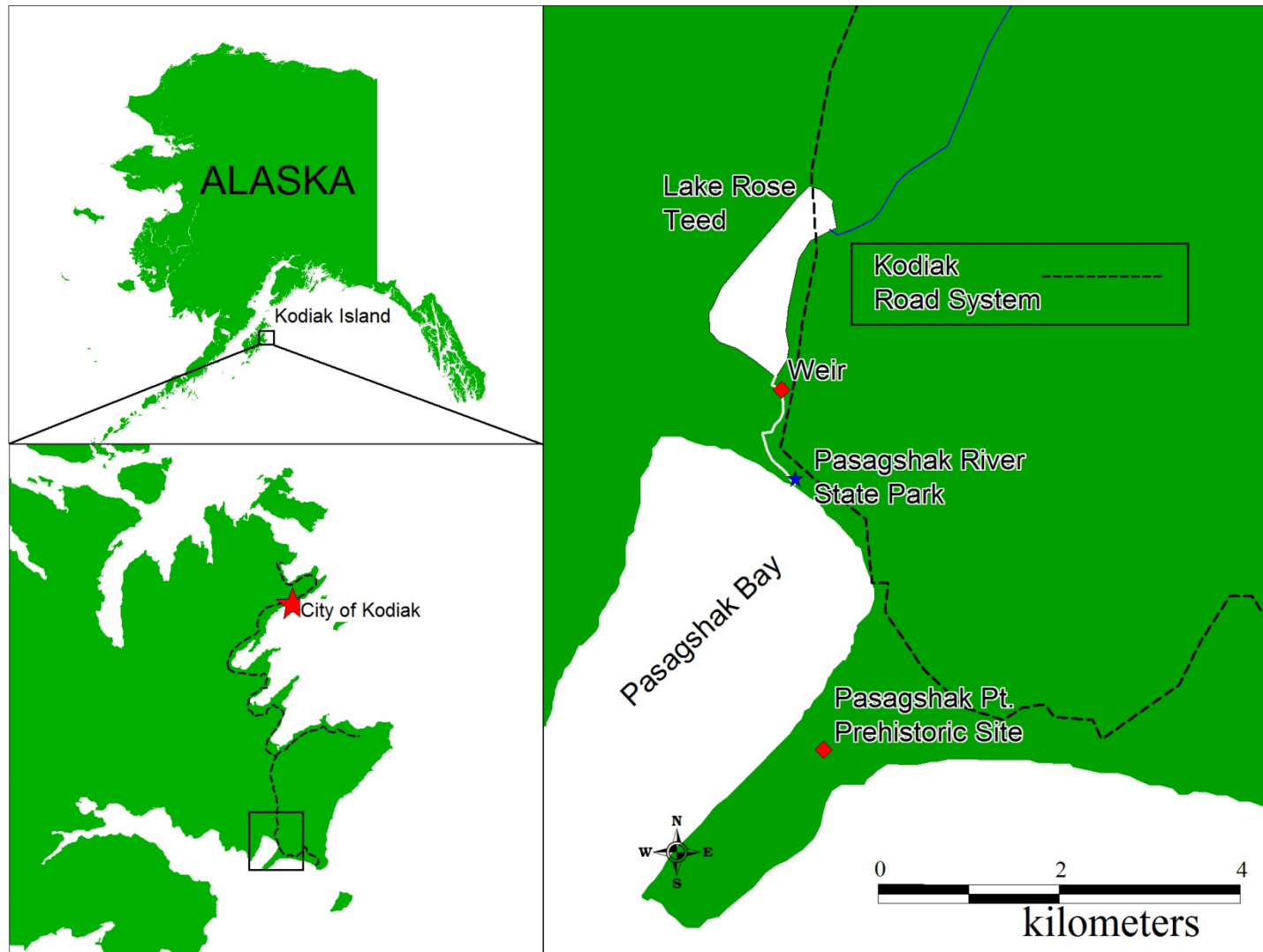


Figure 1.—Map depicting Pasagshak Bay and Lake Rose Teed area on the Kodiak road system.



Figure 2.—Aerial view of the mouth of Pasagshak River, Lake Rose Teed, and the Pasagshak River State Recreation Area.

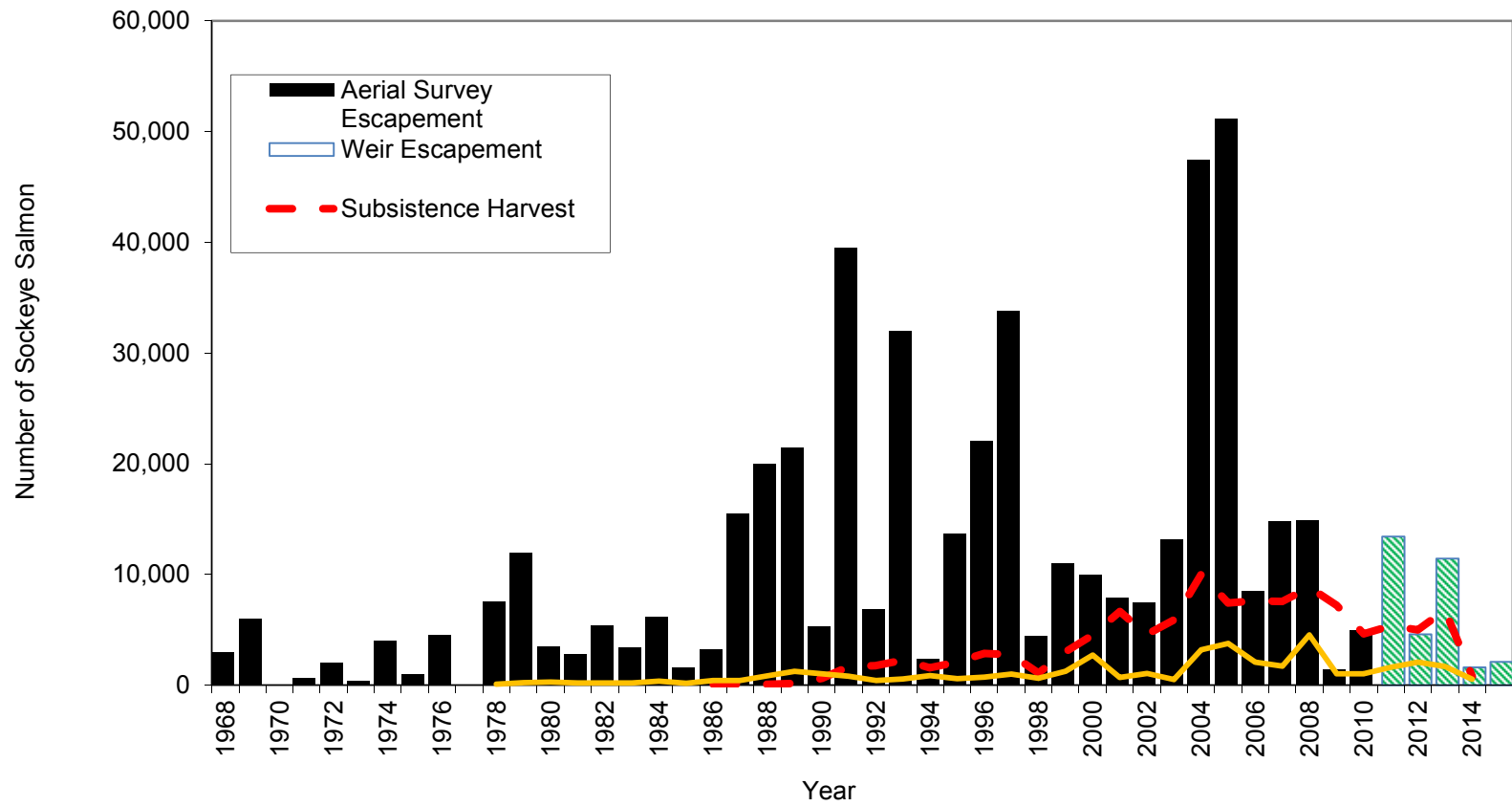


Figure 3.—Historical estimated sockeye salmon escapement and sport and subsistence harvest at Pasagshak River.

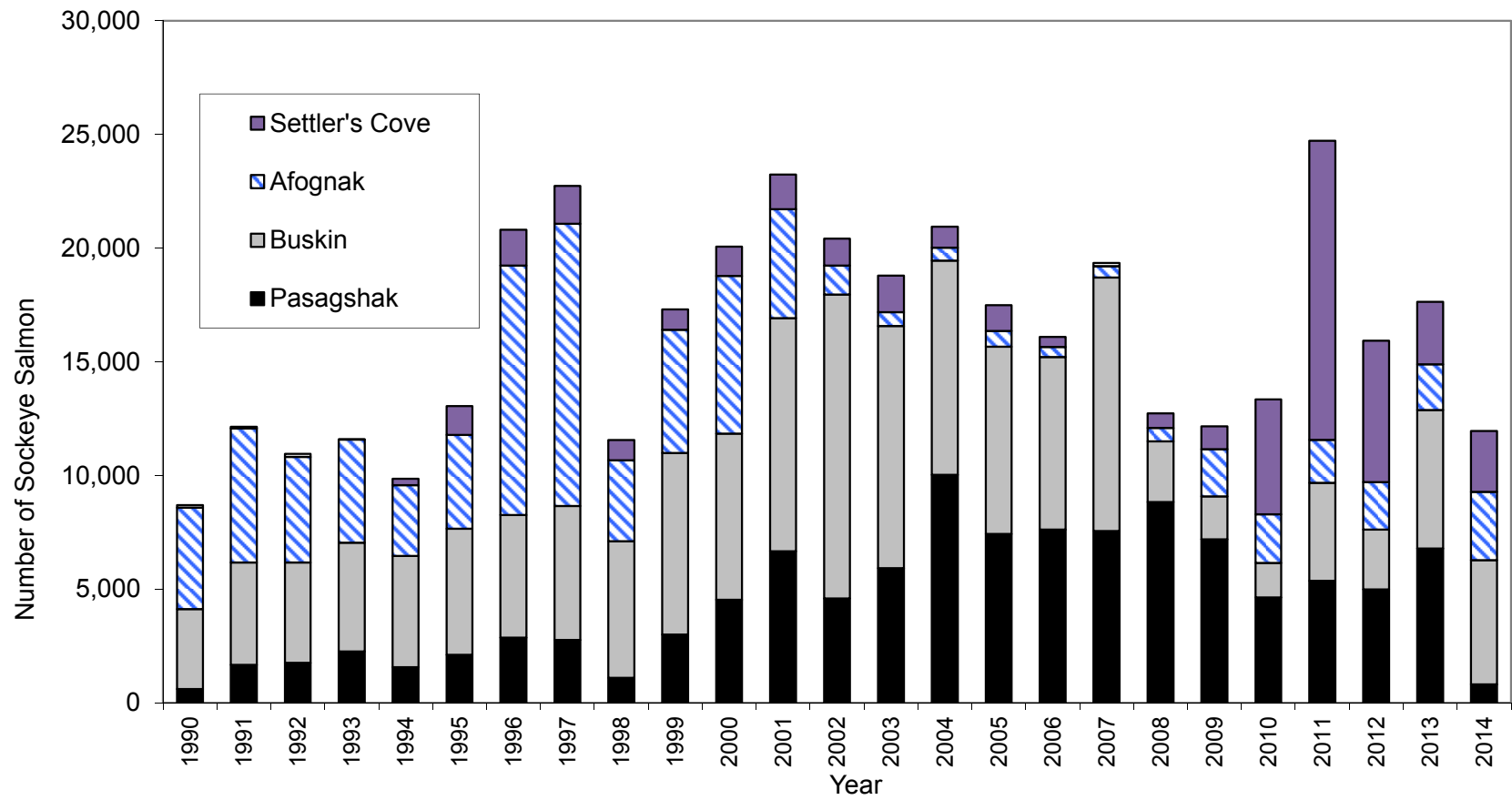


Figure 4.—Historical sockeye salmon subsistence harvest estimates for four important subsistence systems near the City of Kodiak.



Figure 5.—Pasagshak Weir with wood tripods and aluminum panels.

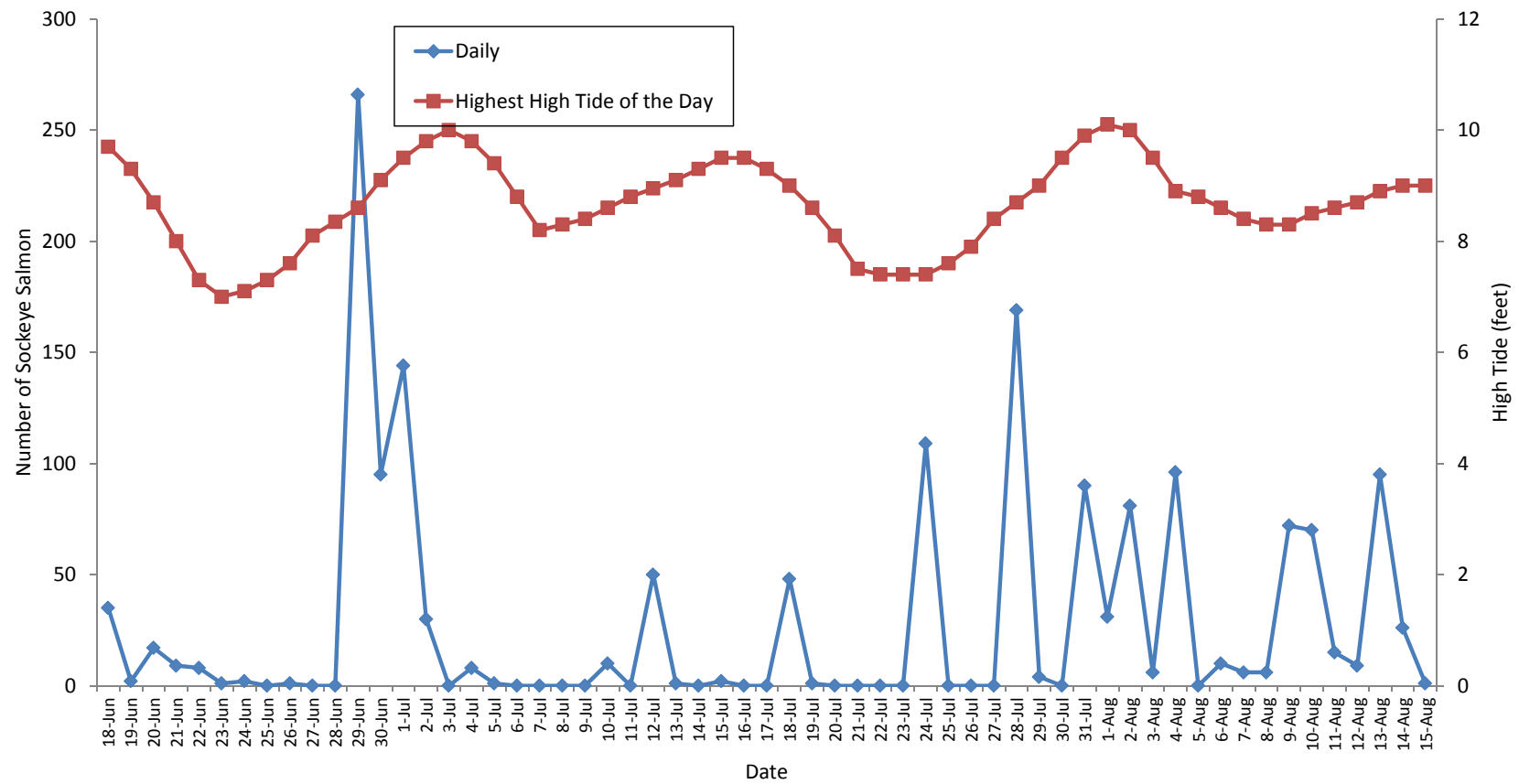


Figure 6.—Daily sockeye salmon passage through the Pasagshak River weir and the corresponding highest high tide of the day, 2015.

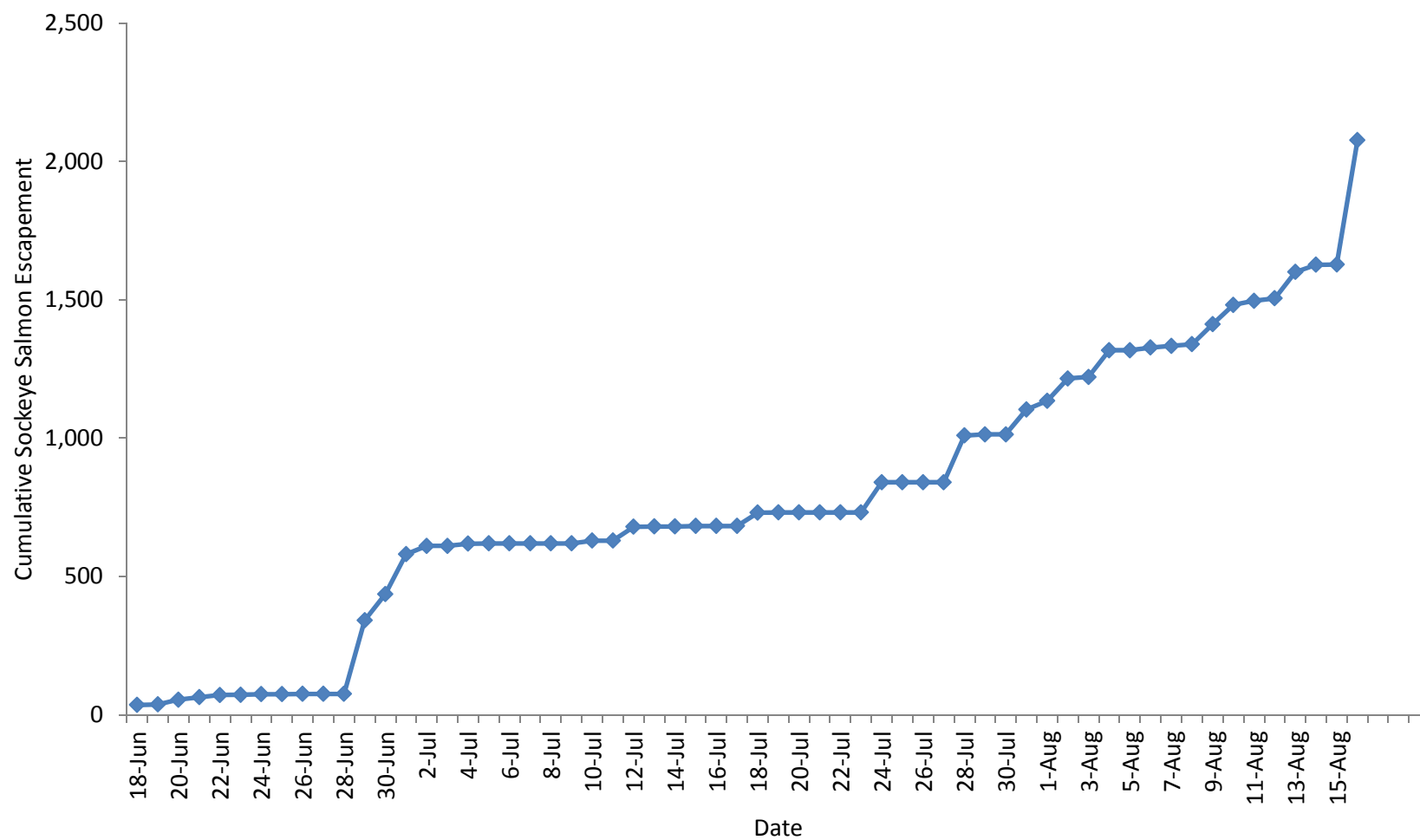


Figure 7.—Pasagshak River sockeye salmon cumulative escapement by day, 2015.

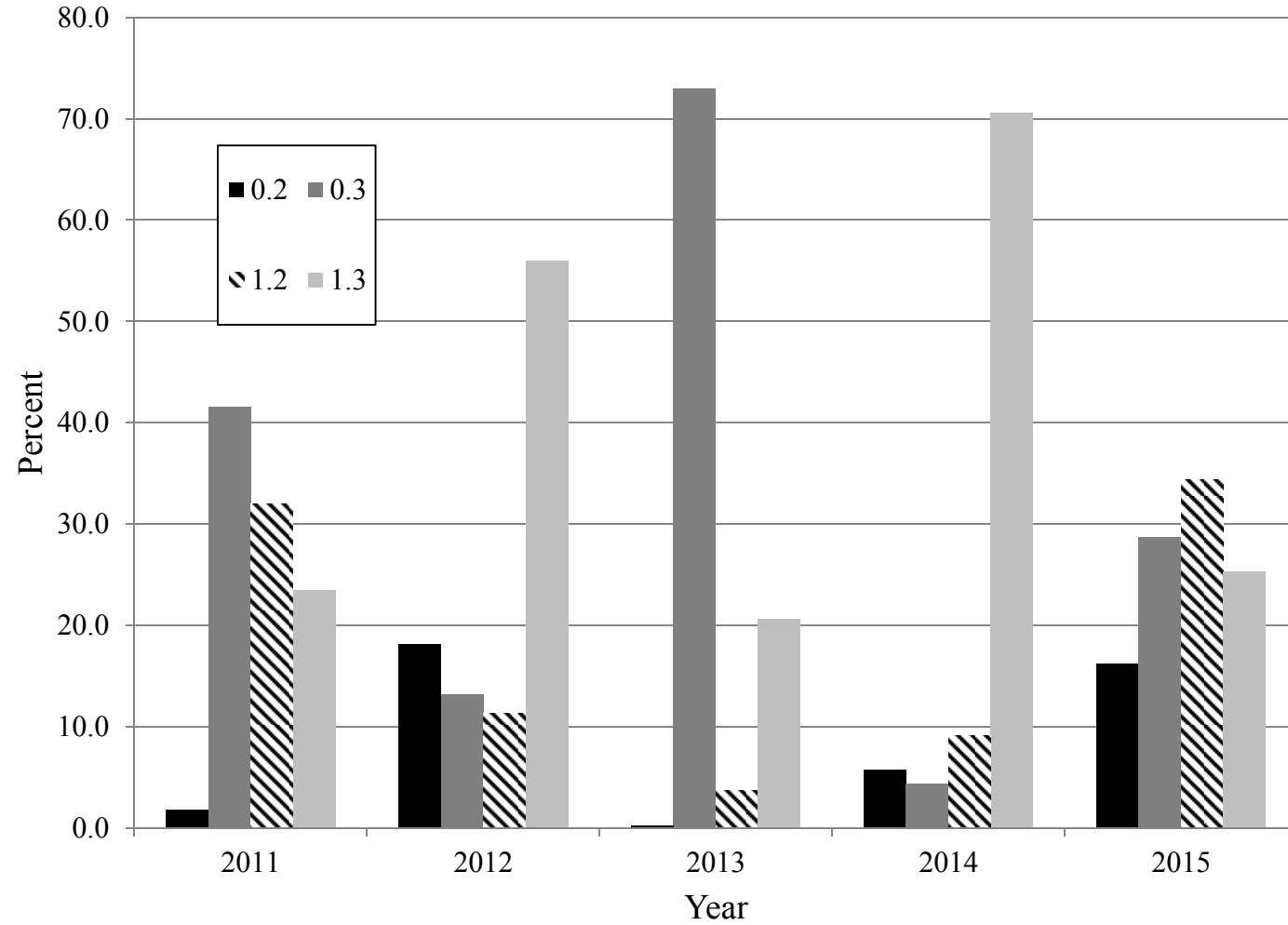


Figure 8.—Major age-class percentage of Pasagshak River sockeye salmon escapement, 2011–2014.

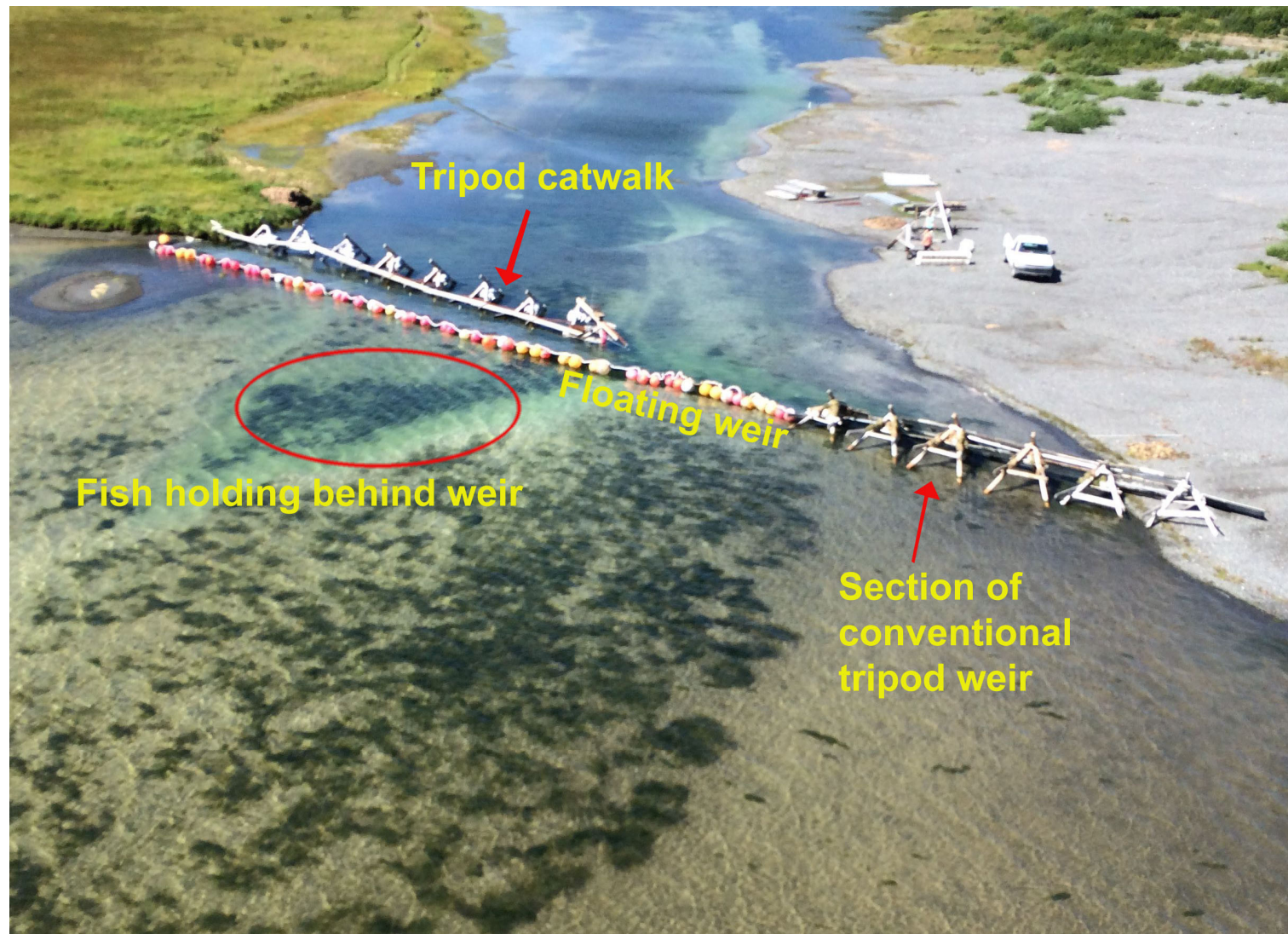


Figure 9.—Aerial view of the Pasagshak River floating weir.



Figure 10.—Pasagshak River floating weir flipped upstream after large upstream current.

APPENDIX A. POST-SEASON LAKE ROSE TEED FOOT SURVEY REPORT

Observer: Mark Witteveen

I conducted an on-site investigation of the closed off mouth at Pasagshak River on September 24 and a foot survey of the spawning distribution of Lake Rose Teed, and below are my observations.

The mouth is indeed fully closed off by a sand berm and there is no observable current in the river. There haven't been any enormous wind events and I've never heard of this happening in the past, so its likely due to lack of rainfall.

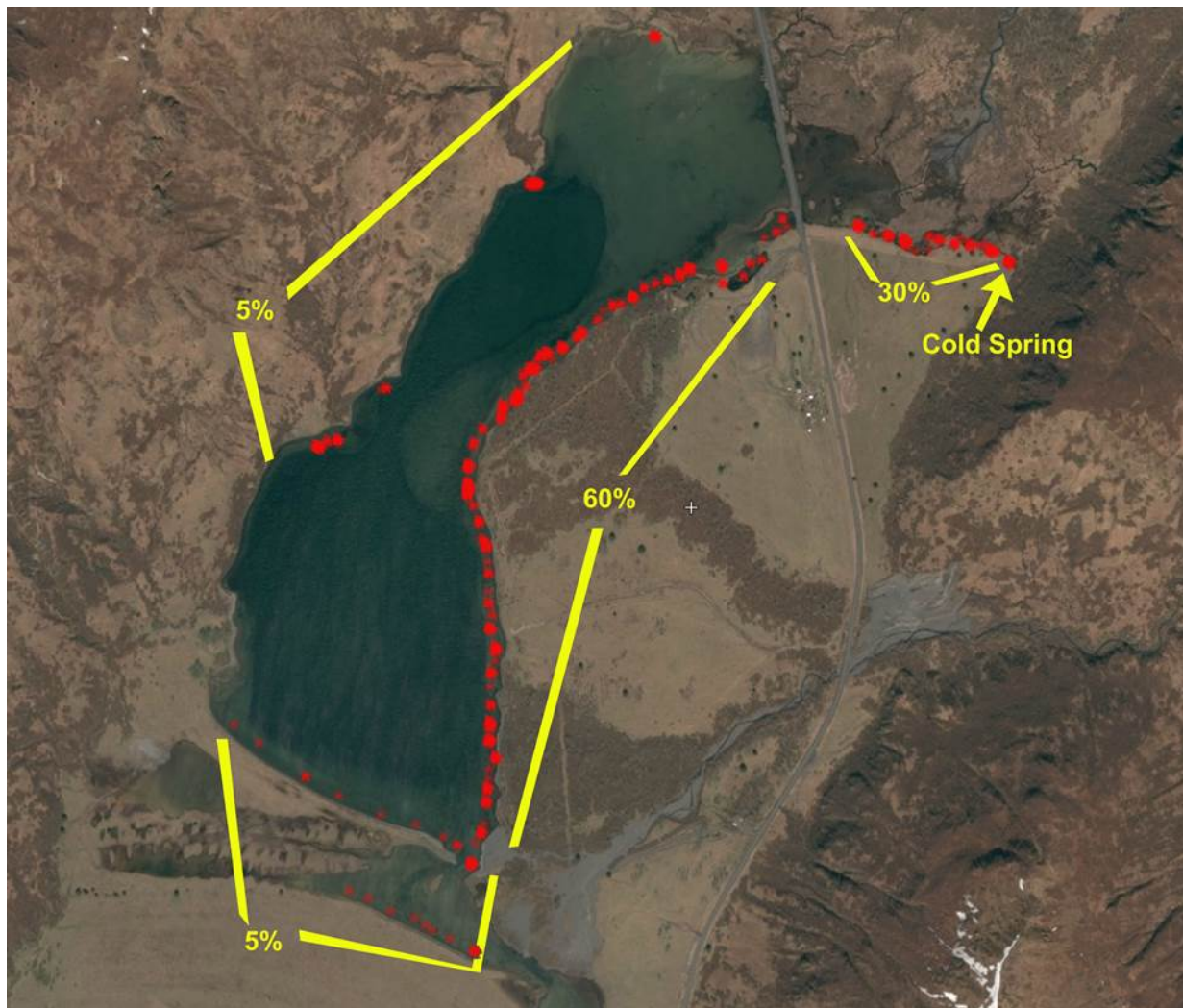


As we observed during our early September aerial survey, the main tributaries leading into the lake are dry, however, there is a spring fed inlet in the westernmost part of the watershed. I investigated that area and found a very distinct spring with fish spawning right up to the source. The water was very cold and clear and despite our recent moderate temperatures, there was ice in several places. This type of habitat is very similar to areas in the Ilnik River watershed which, interestingly, also has a high proportion of age 0 freshwater fish. Of the 2,000 or so fish observed during the survey (5% of which were carcasses, not included in distribution percentages), approximately 30% were spawning in the area fed by the spring. No fish were observed near the

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dry tributary to the north of the lake and the water was rather tannic. Management staff noted that fish are rarely observed in the north tributary.

I walked the rest of the perimeter of Lake Rose Teed and mapped the distribution of spawning fish. Most of the habitat on the west side of the lake was sandy right up to within a couple feet of the shore and the spawning distribution reflected this poor habitat with only 5% of the fish observed occurring in this area. Management staff said they often see a fair amount of spawning activity along the west shore in most years. The lack of freshwater input from the hillside during this season may be limiting use of this area this season.



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The substrate transitions from mostly shale rock to a mix of granite and shale on the south side of the lake with less sand. On the south shore and in the slough downstream of the mouth, there are scattered groups of spawning sockeye salmon consisting of another 5% or so of the spawning distribution. The west shore has the majority of the spawning population with about 60%. Most of those fish are spawning in fairly shallow water, less than 1 meter deep.

The water level of Lake Rose Teed was surprisingly high given the low amount of water input. This is obviously due to the mouth being closed off. There are rumors in social media of an effort to manually open the mouth of the Pasagshak River to allow coho salmon access to the river. It appears that someone had attempted to open the mouth with a shovel. While that effort clearly failed, I'm sure a Trackhoe could quickly open the mouth. Given the shallow spawning activity of sockeye salmon and the likely lowering of lake levels by opening the mouth without a commensurate increase in tributary input from increased rain, I would be concerned about reducing the survival of eggs in established beds. The total escapement of sockeye salmon to Lake Rose Teed this year was only 2,077 fish toward the 3,000 fish goal, so the population may be more vulnerable to decreases in survival than in other years.

If the public approaches the Alaska Department of Fish and Game about permission to manually open the mouth of the Pasagshak River to allow passage of coho salmon into the river, I would recommend against it based on possible water level and spawning habitat impacts to Lake Rose Teed.